Wading Bird/Waterbird Breeding Colonies on the Floodplain

Expectation: Establishment of 5 or more mixed-species wading bird breeding colonies in the floodplain. Excluding Cattle Egrets, each colony will contain at least five species of wading birds or waterbirds (see Table 1), have an average peak nesting season colony size of > 400 nesting pairs (800 individuals) and will persist for at least two consecutive years.

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Relevant Endpoints:
Sociopolitical - Number of Birds
Restoration - Biological Integrity - Reproductive Success/Recruitment
Restoration - Biological Integrity - Persistence
Restoration - System Functional Integrity - Habitat Quality

Baseline Condition: Surveys conducted during 1976-78 by the Florida Game & Freshwater Fish Commission (Nesbitt et al. 1982) found two active colonies, one in an historically documented location and another in a new location (Table 2). Runde et al. (1991) reported four active colonies during 1988-89 surveys of the Kissimmee River floodplain (Table 2), but none were in historic locations. Standardized aerial surveys in 1996 indicated that no colonies were present on the floodplain. One colony of Cattle Egrets (*Bubulcus ibis*) and Little Blue Herons (*Egretta caerulea*) was present in Pool B in 1997, and one colony of Great Egrets (*Casmerodius albus*) and Anhingas *(Anhinga anhinga*) was present on Chandler Slough in 1998. Both colonies were small (< 100 individuals) and limited in number of species.

The limited use of the channelized floodplain by nesting wading birds can likely be attributed to loss of high quality foraging and nesting habitat. Wetland shrub habitat, the preferred nesting substrate for wading birds, has declined in the Kissimmee River floodplain by 83% since channelization (Toth et al. 1995). Buttonbush (*Cephalanthus occidentalis*) and willow (*Salix caroliniana*) stands that currently exist on the floodplain are sparsely distributed and often of small stature. Existing stands of shrubs and trees are not inundated during the nesting season and are therefore not suitable as nesting sites for most wading bird species.

Limited areas of wetland shrubs that have supported active colonies have not been suitable to allow colonies to persist across multiple breeding seasons. Shortened hydroperiod and disconnection of river and floodplain have impacted the production of suitable prey and its availability to nesting wading birds.

Reference Condition: Historical data on colony sites of nesting wading birds were recorded in Audubon Warden field reports (National Audubon Society 1936-1959). Although these data are anecdotal and therefore have biases (Frohring et al. 1988), information regarding the number, location, and species present is generally complete. According to historical reports, six mixed species colonies were present in the Kissimmee River floodplain and associated lower basin tributaries including Chandler Slough, Taylor Slough, Ash Slough, and Cypress Slough (Table 3). Due to temporal fluctuations in local populations, numbers of nesting birds at a given colony changed from year to year, but colonies were active over multiple consecutive breeding seasons. Colonies were composed of an

average of five species of wading/waterbirds and had an average size of 400 pairs (800 individuals). This average was derived from the colony size of all historic colonies except the 1953 colony because the species present at this location are unknown.

Nesting and foraging habitat were abundantly in the historic Kissimmee river system. Expanses of wetland shrubs including buttonbush and willow existed throughout the floodplain and tributaries (Toth et al. 1995). Broadleaf marsh, wet prairie, and the shallow river channel margins provided ideal foraging areas for wading birds. Historic data indicates a maximum of five colonies were active within the floodplain, which likely represents the carrying capacity of nesting habitat in the natural system.

Mechanism for Achieving Expectation:

Reestablished floodplain inundation and extended hydroperiod will facilitate development and/or enhancement of wetland shrub/forest habitat (Toth 1991, Toth et al. 1995). Increased height and area of willow, buttonbush, and cypress will provide improved nesting substrate for wading birds. Restoration of river-floodplain interaction and inundation of floodplain wetlands will increase production and availability of prey items such as small forage fishes and juvenile game fishes (Trexler 1995). Availability of quality foraging habitat nearby influences nest site selection by breeding wading birds and abundance of small fish in shallow or drying wetlands stimulate wading birds to nest (Frederick 1995). Accessibility of large numbers of fish is a stimulus for the formation of colonies by White Ibis (Kushlan 1973, Frederick 1995). Great Egrets and Wood Storks are stimulated to nest in a particular area by the abundance of large fish (Frederick 1995). In all ciconiiforms, there seems to be a direct link between the availability of food and the amount of nesting effort, as well as reproductive success (Ogden et al. 1980, Burger 1982, Kushlan 1986, Frederick 1995).

The two wading bird colonies that were active during the baseline period indicate that appropriate nest substrate exists in the floodplain. Therefore, it is reasonable to expect colonies to become active at these locations after restoration, with a greater likelihood of persistence due to increased prey base. The maximum number of nesting pairs will be determined at each colony by the availability of prey and nesting substrate. Wading bird colonies can be very transient, depending upon reproductive success of nesting birds in a given breeding season. Persistence of a colony for consecutive years indicates good habitat quality. Size of individual colonies will change from year to year.

Restoration of mixed species wading bird colonies will initially be facilitated by immigration of adult birds from other areas. Some species of wading birds are extremely nomadic (Frederick et al. 1996, Melvin et al. 1999) and this mobility enables them to quickly colonize newly available habitat. After two or three successful nesting years, the population of wading birds in the Kissimmee floodplain will begin to increase due to local reproduction.

Adjustments for External Constraints:

Populations of many wading bird species have been declining since the 1900's; therefore establishment of historical numbers of nesting wading birds may not be feasible. Another constraint on the number of nesting wading birds is competition for nest space by the naturalized Cattle Egret (Burger 1978). Habitat conditions outside of the project area may affect the magnitude of response by nesting wading birds. If drought conditions occur elsewhere, a greatly inflated response may occur within the floodplain. If habitat conditions are favorable throughout the state, wading birds will be spread out across a larger area and the response may be less than expected in the Kissimmee floodplain.

Means of Evaluation:	Colonies will be located by standardized aerial surveys at the beginning of the nesting season (January or February). Colonies will be visited at least twice by helicopter and once on the ground to estimate the number of nests and number and species of adults present. Persistence of the colony from year to year will be the best indication of improved habitat quality.
Time Course:	Because this restoration expectation depends on both the availability of high quality prey and establishment of vegetation suitable for nesting and production of prey, there will be a time lag for the full response. Wading bird colonies within appropriate existing habitat are expected to become active as soon as fish and invertebrate communities respond. Increases in appropriate nesting substrate will take some time to develop. During the Pool B demonstration project, willow communities expanded in response to hydrologic changes within 4 years (Toth 1991). Emergent wetlands (Toth 1991) and fish communities (Trexler 1995) are expected to respond more quickly, increasing foraging habitat within 1-2 years of restoration. Therefore, a response by White Ibis will likely occur within the first 1-2 years. Great Egrets, Great Blue Herons, and Wood Storks utilize larger fish as prey. A response by these species will likely occur as soon as fish move into floodplain wetlands and become trapped by drying conditions. Establishment of mixed species colonies should be seen 2-4 years after completion of all phases of re-construction and restoration of floodplain wetland habitat.

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Table 1. Common wading bird and waterbird species likely to establish colonies in restored wetland shrub habitat within the Kissimmee River floodplain and tributaries (National Audubon Society 1936-1959).

Common name	Scientific name	Historic location
White ibis	*Eudocimus albus*	Kissimmee River, tributaries
Glossy ibis	*Plegadis flacinellus*	Tributaries
Great egret	*Casmerodius albus*	Kissimmee River, tributaries
Great blue heron	*Ardea herodius*	Tributaries
Little blue heron	*Egretta caerulea*	Kissimmee River, tributaries
Tricolored heron	*Egretta tricolor*	Tributaries
Snowy egret	*Egretta thula*	Kissimmee River, tributaries
Green heron	*Butorides striatus*	*
Black-crowned night heron	*Nycticorax nycticorax*	Tributaries
Yellow-crowned night heron	*Nycticorax violacea*	Tributaries
Cattle egret	*Bubulcus ibis*	*
Wood stork	*Mycteria americana*	Tributaries
Limpkin	*Aramus guarauna*	Kissimmee River, tributaries
Anhinga	*Anhinga anhinga*	Kissimmee River, tributaries
Double-crested cormorant	*Phalacrocorax auritus*	*

*Not documented in historic data, however, likely to nest in mixed species colonies in the restored system.

Table 2. Wading bird colonies active in the channelized Kissimmee River floodplain (Nesbitt et. al 1982, Runde et. al 1991).

Colony Location	Years Active	Species Present	Average # of individuals
Wolf Sawgrass Slough[a]	1976-77	Cattle Egret, Yellow-Crowned Night Heron, White Ibis	50-150
Yates Sawgrass	1976	Cattle Egret, Great Egret	1550
Seven-Mile Slough	1989	Great Egret, Great Blue Heron	11-100
S65-D	1988	Great Egret	1-11
S65-E	1988-89	Great Egret, Great Blue Heron, Anhinga, Cattle Egret, Small White Herons (?)	100-250
Mouth of Kissimmee	1988	Great Egret, Great Blue Heron	11-100
Pool B (Avon Park Air Force Bombing Range)	1997	Cattle Egret, Little Blue Heron	< 100
Chandler Slough	1998	Great Egret, Anhinga	65

[a] Historic colony location.

Table 3. Wading bird colonies active in the historic Kissimmee River floodplain (National Audubon Society 1936-59).

Colony Location	Years Active	Species Present	Average # of individuals
Chandler Slough	1949-51	White Ibis, Limpkin, Black-Crowned Night-Herons, Yellow-Crowned Night-Herons, Great Egret, Herons (?)	1200
Bluff Hammock	1949-55	Sandhill Crane, Little Blue Heron	600
Cypress Creek	1938-50	Great Egret, Snowy Egret, Wood Stork, Great Blue Heron, White Ibis, Little Blue Heron	900
Ash Slough	1949-55	White Ibis, Black-Crowned Night-Heron, Yellow-Crowned Night Heron, Great Egret, Little Blue Heron, Tricolored Heron	1025
Wolf Sawgrass Slough	1948-54	White Ibis, Little Blue Heron, Tricolored Heron, Great Egret, Snowy Egret	300
Kissimmee River Bridge	1953	unknown	4000

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